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THEATER LEVEL MAINTENANCE SUSTAINMENT SUPPORT FOR THE FUTURE

by

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ABSTRACT

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For decades, the Army's force structure and doctrine have provided for general support maintenance companies to perform sustainment support to forces deployed in a theater of operations. Within the force structure, these units have been split between active and reserve components, with the preponderance allocated to the latter. This paper addresses that force structure and doctrine and explores the differences between its conceptual and actual capabilities. The findings are based on a review of doctrinal publications, Army regulations, Tables of Organization and Equipment, and periodicals, supplemented by interviews conducted with the senior staff of 2 reserve component general-support heavy equipment maintenance companies and with a former commander of the 544th Maintenance Battalion, Ft. Hood, Texas. These interviews underscore the pragmatic differences between the force structure concept and the actual "go to war" capabilities of these units. This paper then addresses development of an organization which provides the theater commander with the sustainment capability required by his forces and mission, through the use of Army depot and contractor personnel. The proposed organization is keyed to the lessons learned from the establishment and deployment of a provisional organization, the U.S. Army Support Group, during Operation Desert Shield/Storm.

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Figure 1: Forward Logistics Support Group Structure (p. 22)



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INTRODUCTION

Operation Desert Shield/Storm (ODS) provided our senior military leadership with the first opportunity in more than twenty years, to assess our "real world" capability to deploy and sustain a massive combat operation in an undeveloped theater. The overall operation and our resounding victory attest to the numerous aspects of our force structure and doctrine which are sound. Concurrently, it surfaced many areas where weaknesses exist in either force structure, doctrine or both. Equally important, ODS provided the opportunity to develop and test the viability of new organizations and/or operations within the broader context of our overall systems.

In this paper, I will address a shortfall in the Army's maintenance doctrine and force structure, as it affects the warfighting Commander-in-Chief's (CINC's) ability to sustain his combat forces. I will also identify a solution to an historic problem associated with sustainment maintenance in a theater of operations.

Much of the information contained herein is based on the experiences of the author and on interviews, as well as a review of logistics Field Manuals and Tables of Organization and Equipment (TOE's) and Tables of Distribution and Allowance (TDA's).

FORCE STRUCTURE AND DOCTRINE

The Army's structure for maintenance is traditionally divided into four broad categories: organizational, direct support, general support and depot. Within that structure, general support (GS) and depot maintenance are usually associated with sustainment support, because of their doctrinal missions of repair and return to the supply system. Following this progression one step further, the GS maintenance units allocated to the CINC represent his sustainment maintenance capability. For the majority of weapon system commodities (less aviation and missile) that capability is vested in Heavy Equipment Maintenance Companies (HEMCO's), TOE 43-238J500, and Light Equipment Maintenance Companies (LEMCO's), TOE 43-237J500.

According to Army doctrine, GS maintenance companies are assigned to echelons above Corps (EAC), with a primary mission of repairing end items and associated components for return to the theater supply system. Heavy Equipment Maintenance Companies repair tactical, construction, combat vehicles, small arms, instrument and fire control and tank turret systems and their associated components.¹ Correspondingly, LEMCO's repair communications/electronics items, FM radios, quartermaster/chemical equipment, power generation equipment, refrigeration and utility

equipment and their associated components.²

Force structure for GS maintenance companies is similar in composition to most EAC combat service support units: they are heavily apportioned to the composition 2 and 3 reserve components. Our current force structure (TAA 96) authorizes 55 HEMCO's and 25 LEMCO's, with an aggregate of 11 units (7 HEMCO's and 4 LEMCO's) or 13.75 percent allocated to the active force (composition 1). The projected future force structure (TAA 99) calls for a net reduction of 35 percent in general support maintenance unit authorizations. Under TAA 99, the mix between active and reserve components is relatively equivalent to that of TAA 96.³ However, it is neither the number nor the mix of active/reserve component general support maintenance companies that should concern our force structure and doctrine writers. A unit's ability to perform its mission is the bottom line.

CAPABILITY VERSUS CONCEPT

Many of us believe that ODS was not atypical of what we might expect to encounter on the future battlefield. The mindset of a major "high-intensity" conflict against a known enemy in a developed theater of operations has been broken. More and more, as the world situation evolves, we can be expected to mobilize and deploy into a theater of operations like Southwest Asia where we would have to build from the ground up in terms of both combat and sustainment force capability. From the CINC's perspective, it is absolutely imperative under this scenario that all forces deployed

be fully capable of performing their designated missions. Unfortunately, there are far-ranging disparities between organizational design and actual capabilities for both active and reserve component GS maintenance companies which adversely affect their ability to provide the requisite sustainment support for the deployed forces.

Reserve component GS maintenance units experience far greater challenges in attaining and retaining proficiency than their active component counterparts. For the most part, technical skills learned through formal training can be retained only through repetitive application. The limited number of training days available to reserve component units does not provide the organizations with an adequate opportunity to reinforce all the necessary skill areas. To further complicate the situation, their training sites often do not have the range of equipment available to provide the repair technicians the opportunity to ply their skills.

The Army's force modernization over the past decade has placed the composition 2 and 3 units at a further disadvantage. With each of the new weapon systems (e.g., the Abrams Tank, the Bradley Fighting Vehicle System, the Patriot Missile, et al.), the Army has introduced new technologies, requiring new skills and new and different special tools and test equipment. For the most part, reserve component units have either not received the initial training required to attain the necessary skills or their part-time technicians could not be made available for such training.

Furthermore, few if any of these units received the special tools, test equipment or repair parts to repair the newer weapon systems or their components. This latter problem results from the provisioning process used in the development and fielding of weapon systems. Because of funding constraints, few of the weapon system Project Managers (PM's) or Program Executive Officers (PEO's) provision for the procurement of sufficient sets of special tools and test equipment for their systems to accommodate all active and reserve component requirements. This situation places the PM's and PEO's in the business of managing shortages, based on coordination with the Army staff, the National Guard Bureau (NGB) and the Office of the Chief of Army Reserves (OCAR). While such decisions are economically based and well-intentioned, they often fall short of satisfying either the needs of the reserve component units or those of the warfighting CINC at time of mobilization and deployment.⁴

Active component HEMCO's and LEMCO's suffer similar shortfalls in mission capabilities. For example, the 190th HEMCO and 647th LEMCO, attached to the 544th Maintenance Battalion, 13th Corps Support Command (COSCOM), Fort Hood, Texas, are representative of other composition 1 HEMCO's and LEMCO's in the force structure. The 190th was capable of repairing only about 30 percent of the range of equipment for which it was designed. In Saudi Arabia, it was assigned the mission of operating a Collection and Classification Point, not one of component or end item repair. The 647th LEMCO was capable of repairing about 50 percent of the range of electronic items and 15 percent of power generation equipment.

and air conditioners.⁵

Unlike the reserve component units, reductions in the capabilities of the active component units results from a long-term erosion in unit structure to appease the installation infrastructure. Over time, the Directorates for Logistics (DOL) at the various installations in the Continental United States have established in-house repair capabilities in their TDAs at the expense of our general-support maintenance TOE units. As a result, the full-time missions for such active component units become what the installation DOL is willing to let them have. The active component response to this situation manifests itself in reduced peacetime capability by eliminating certain skills as the authorized level of organization (ALO) for the unit is reduced. For example, the 190th HEMCO has eliminated most of its track vehicle mechanics under its current ALO-3 structure, because most of the track vehicle component repair work at Ft. Hood is done by the DOL.⁶

The lack of capability within the GS maintenance structure in the Army should have come as no surprise, even to a casual observer. Collectively, the responsible agencies (Training and Doctrine Command, Forces Command, NGB and OCAR) have wrestled, with varying (and sometimes questionable) degrees of success, with the issues and challenges associated with training the reserve component force. From the active component perspective, our senior leadership over the past 15 or 20 years has been willing to trade off -- civilianize -- combat service support spaces to accommodate

major force structure realignments.

CONTINGENCY DEPOT OPERATIONS

As the senior logistics leadership at the Department of the Army (DA) and Army Materiel Command (AMC) observed the structuring and movement of units of the Time Phased Force Deployment List throughout August, 1990, they became concerned that there did not appear to be sufficient theater maintenance sustainment units being deployed or earmarked for early-on deployment within the first 90 to 120 days. In late August, AMC tasked the U.S. Army Depot System Command to develop a concept to provide sustainment maintenance in the theater of operations. With minimal guidance and an unknown requirement, the AMC community, with DESCOM in the lead, displayed a unique ability to assemble and deploy an organization (the U.S. Army Support Group, with a roughly 85% civilian - 15% military mix) capable of providing component repair across a broad commodity range, as well as limited wholesale supply and materiel retrograde support to the Southwest Asia Theater of Operations.⁷ With DESCOM providing the planning nucleus and most of the manpower, AMC rapidly expanded its base of operations and deployed weapon-system unique teams of various sizes to provide concurrent force modernization support to the deployed and deploying force.⁸

As a result of the general recognition of the successes of the U.S. Army Support Group,⁹ DESCOM forwarded to AMC the following concept to incorporate a similar organization in our force structure to sustain future contingency operations. The concept

plan was based on the following assumptions:

1. The combat force structure and its organic combat support and combat service support slice will continue to be highly mobile, with a minimal number of days of sustainment capability as part of their organizational composition.
2. The TPFDL will always be heavily front-loaded with combat units, particularly in an undeveloped theater of operations where there are no land forces in place to deter aggression.
3. The build down of our uniformed services (active and reserve component) will not reduce our international responsibilities.
4. The challenges which inhibit our ability to maintain a fully-equipped and highly-trained active and reserve component force will continue into the next century.
5. Contingency operations in third-world countries will present the predominant challenges facing our forces in the foreseeable future.

The Army force structure needs to recognize and document an organizational element similar to the U.S. Army Support Group. The purpose of such an organization would be to provide wholesale-level maintenance and supply sustainment to an operational theater to ensure optimum readiness of the deployed and deploying forces. Its primary missions would be component repair of critical depot-level reparables, wholesale supply of selected high-dollar, high-technology, low-density repairable components; supply support to internal maintenance operations; retrograde of excess serviceable

and unserviceable class IX and excess class II, IIIIP and IV materiel; and command and control of contractor-operated forward repair activities (FRA's). The unit should be established under a mobilization TDA (MOBTDA) which, from a maintenance perspective, would be modularly structured to support a wide variety of tactical scenarios. The MOBTDA must be fully documented and authorized under the Army Authorization Document System (TAADS), with a permanent unit identification code (UIC) and Department of Defense Activity Address Code (DODAAC). When activated, it would be staffed with full-time civilian and military personnel assigned primarily to AMC. This configuration would enable the wholesale logistics community to deploy optimum sustainment support forward into the contingency theater, without impacting on manpower and end-strength ceilings.

The majority of the staffing for the MOBTDA would come from volunteers throughout the CONUS industrial depot complex and other organizations within AMC. Involuntary deployment of some personnel may prove necessary, however, to ensure support of all deployed weapon systems. Many of the positions within the MOBTDA are so essential to the command, control and operations of the organization that selected personnel would have to be identified and assigned in advance by position/grade/skill. The preferred method to accomplish this designation would be to array the MOBTDA against all of the TDA's throughout AMC and then designate peacetime TDA positions by paragraph and line number as emergency essential positions on the MOBTDA. There are several advantages to

this approach: it establishes the requirement to mobilize as a precondition of employment for incumbents of these positions; there are specific regulatory requirements with respect to passports and training that will ensure that a core of critically-essential personnel will be ready for rapid deployment to establish baseline operations; and it provides an identifiable cadre to participate in planning and exercise drills. By arraying the MTDA against all the TDA's in AMC, we are better able to stratify all critical personnel requirements without adversely impacting on the mobilization mission capability of any one organization.

ORGANIZATION AND FUNCTIONS

At Figure 1 is a proposed organizational structure for a mobilization or contingency depot operation. The next several paragraphs address the various functional responsibilities of each major element.

The functions of the Command Group are self-evident: to establish command and control over the activity. The commander will also be the focal point to interface with the CINC's logistics planners and operators and with the wholesale system for on-the-ground requirements. Upon notification of the need for mobilization, AMC should coordinate with Personnel Command to immediately designate a central command select primary or alternate colonel with a 91 or 92 specialty as commander of the unit. The Civilian Executive Assistant or deputy should be in the grade of GM-15 and be predesignated from one of the CONUS depots in the

MOBTDA.

The Plans and Operations Support Division would be responsible for the internal base operations and resource management of the activity. Missions would include personnel management, budget and resource managememt, unit supply and property book, communications and automatic data processing (ADP) requirements, as well as facilities engineering, security and morale and welfare support.

The Supply Division would have responsibility for all mission-related supply functions (wholesale supply, supply support to maintenance and retrograde processing). It would establish liaison and coordinate with the theater-level G4/J4 and materiel management center (MMC) to assist in determining requirements and to effect interface with the retail customer support pipeline for designated items of supply. With the consolidation of supply depot operations, an interface with Defense Logistics Agency (DLA) will be essential to ensure that direct supply support is provided. This activity is not intended to subvert or replace the theater MMC's responsibility to interface with the wholesale system. In addition, the Supply Division will have limited capabilities to provide supply technical assistance to theater customers.

The Maintenance Division would be responsible for planning and production control for its component repair mission. It would also interface with the theater-level G4/J4 and MMC to forecast requirements and to develop a baseline against which to call forward thee requisite repair teams. It would also have to coordinate its operations with the theater support chain. Although

designed primarily to perform limited depot maintenance out of a fixed facility, it should be able to conduct a limited amount of off-site missions without detracting from its primary functions. Should the theater direct any major force modernization or equipment modification requirements, the Maintenance Division would be capable of receiving discrete teams, manned and equipped from the CONUS industrial base, to accomplish these missions.

The Procurement and Contracting Support Division will have two distinct missions. Its primary role would be "command and control" over the various contractor FRA's operating within the theater. (The requirements generating this mission will be discussed later in this paper.) The commodity-oriented teams within this division will be the primary interface between theater logisticians and the contracting officer's representatives (COR's) for each FRA to align requirements and capabilities in support of theater readiness. They will provide workload guidance to the COR and the contracting officer on contract modifications required to enhance operational support to the theater. The secondary mission of the Division involves local contracting, lease and purchase support for the internal operations of the mobilization/contingency depot. These requirements could include facilities, services, supplies and equipment. This Division will also interface with the Plans and Operations Support Division and the Theater procurement activity to ensure that internal requirements are expeditiously accommodated, without duplication of effort.

The Quality Assurance Division will exercise the standard

quality assurance/quality control functions over all operational elements of the organization for the commander. It may also, upon request, provide external support within its capabilities.

EQUIPMENT AND SUPPORT

When the concept is adopted for integration into our force structure, the finalized MOBTDA organization must be equipped to the fullest extent possible. It would, however, not be nearly as costly to facilitate such a unit as one might expect. An array and depth of some special tools and test equipment would have to be procured, but much of what would be needed to accomplish the mission may well be available, at the baseline level, within current depot authorizations. Losses of some (not all) of the tools and test equipment associated with a weapon system at a given depot would only reduce depot capability, not eliminate it. The projected reduction in depot capability would be more than offset by the reduced number of components and, to some degree, end items being retrograded to the wholesale industrial base in the CONUS. All the same, certain items, like communications equipment (to include satellite links, radios and telephones), computers and ancillary ADP equipment would have to be procured or leased at time of mobilization. If procured, the equipment should be staged at a designated depot to facilitate deployment, or earmarked in advance for use by the contingency organization. If the decision were to lease this equipment, then provisions would have to be in place to ensure rapid acquisition and staging for deployment.¹⁰

Individual tool boxes would be deployed from the respective CONUS depots with the repair technicians.

For management of maintenance production and shop supply, we should adapt the Standard Army Maintenance System (SAMS) and the appropriate computer hardware to operate it. The Standard Depot System (SDS) maintenance production planning and control modules requires a mainframe computer and is far too powerful, cumbersome and unwieldy to support the dynamics of the bay-shop operation envisioned for the contingency depot. The SDS is specifically designed to support a fixed-base industrial operation, with the attendant detailed cost-accounting requirements. A similar problem exists with automation of supply support to maintenance: the AMC Installation Supply System is far too unwieldy and powerful to suit the requirements of a deployed contingency depot operation. On the other hand, the SDS wholesale supply applications are essential for the visibility and accountability of wholesale supply and retrograde processing operations.

MOBILIZATION CONSIDERATIONS

Upon notification of mobilization in support of a contingency operation, AMC must dispatch a planning cell to the headquarters of the designated CINC (e.g., Central Command) to assist in logistics support planning and requirements determination. Inasmuch as the contingency depot is modularly-structured from a maintenance standpoint, this phase is essential for sizing the organization to be deployed. The planning cell would also have to

coordinate the insertion of the unit into the TPFDL.

Concurrently, DESCOM or its successor, the Industrial Operations Command (IOC), must activate a rear planning cell to interface with the AMC cell and mobilize the depot activities. This rear planning cell will consist of personnel, supply, maintenance, transportation and information management specialists capable of coordinating recruitment, mobilization and deployment of the contingency depot. The rear planning cell would continue in being for the duration of the operation as the central focus for mission planning and resourcing. This role would include the coordination and execution of requirements placed upon the contingency depot by the wholesale community, e.g., PEO's, PM's, AMC major subordinate commands, and DLA.

CONTRACTOR SUSTAINMENT MAINTENANCE

The need for commercial contractor maintenance personnel within our force structure dates back at least to the fielding of the HAWK missile system over 20 years ago, perhaps long before that. It has become much more pronounced, however, within the last decade as new technologies have been introduced with the force modernization systems. These technologies have had the cumulative effect of markedly enhancing the combat power of our conventional forces, when fully integrated on the battlefield. While this technological "edge" has enhanced the CINC's ability to prosecute the warfight, the rapid advances in many areas, coupled with sophisticated and costly repair procedures, have forced the services to look to

contractors for sustainment support. From a practical standpoint, however, our current organizations within a theater are not designed or staffed to deal with an expanding number of individual contract activities in either the planning or management of sustainment support operations.

Almost without exception, decisions on how weapon systems will be supported are made at the wholesale logistics or service department level. They involve one of 3 basic choices:

1. Organic support, where all required maintenance for a particular system will be accomplished using in-house resources.

2. Contractor support, where all maintenance above operator-level checks and repairs are performed by a designated contractor.

3. A mixed type of support, where certain components or a certain level of maintenance for a weapon system will be performed by a contractor, with others accomplished with organic manpower resources.

When contractors are involved in some aspects of logistics sustainability, the basic contract instrument is usually awarded at the wholesale level for a particular system. Within the Army, the Procurement and Production Directorates of the AMC commodity commands are responsible for development, award and management of these contracts. The contracting officer (KO) and the COR's work for the particular commodity command. The contracts are centrally funded and managed in the aggregate, regardless of the number of subactivities the contractor may require.

During peacetime, contractor logistics support at the unit level is usually handled off-line at the DOL for the installation. The MMC at the Corps or Division will normally coordinate with the DOL but not actively engage in contractor support management, except for monitoring readiness rates. When units mobilize to a combat theater, however, the DOL does not deploy, but the individual contractors will. The commodity-oriented managers at the MMC (which also deploys) suddenly find themselves immersed in a quagmire as they attempt to identify support sources and integrate an increasing number of contractor operations into their support plans. They soon realize that each contract is different in terms of the range and quantity of services provided, and it often may not meet their anticipated requirements. Management of change to accommodate forecasted needs will prove to be a complex and frustrating experience.

To assist the theater logistics planners, and to ensure responsive contractor support, the contingency depot will exercise overall contract management through the Procurement and Contracting Support Division. This level of management would include identification of contractor capabilities to the theater, articulation of requirements and priorities identified by the theater to the contractor through the COR, and acting as the interface between theater, COR and contracting officer in negotiating contract change requirements.

CHALLENGES

Upon approval and adoption of this concept, as the most viable approach to providing responsive sustainment to our deployed forces in an undeveloped theater of operations, it must be inculcated into all aspects of our contingency planning. While maintenance policy currently provides for consideration of the employment of both government and contractor civilian personnel in a theater operations,¹¹ there is very little mention of it in our current doctrine. In addition the mindset throughout all institutions in the Department of Defense must be changed: the institutional culture will have to recognize and accept a substantial increase in the numbers of civilians employed in an operational theater, to include the increased responsibilities for rear-area security that the presence of these people and their facilities poses. Correspondingly, activities such as DLA will have to refocus their support planning and strategies toward a more direct involvement in the theater to ensure that we have a totally integrated structure to support the CINC in the execution of his plans; this requirement will increase as the consolidation of the CONUS wholesale distribution mission under DLA proceeds. To assist in this process, we need to integrate the contingency depot into major training events like CASCOM's biennial Logistics Exercise (LOGEX), National Training Center (NTC) rotations and Bright Star.

The LOGEX, as the major logistics command post exercise for planning support to contingency operations, provides the training base to incorporate the contingency depot as an integral element in

the theater support structure. Being scenario-driven, LOGEX would assist the AMC and DLA community in assessing potential requirements in a variety of operational environments and allow them to better adjust the organizational structure to align with evolving doctrine and tactics.

Mobilization of some elements of the contingency depot in support of one or more rotations at the NTC or for Bright Star would provide operational experience in a high-intensity tactical environment. Such operations would provide DESCOM/IOC with the opportunity to activate and exercise to activate and exercise its rear planning cell to perform all of the functions that would be required in an actual contingency.

CONCLUSION

Our ability to manage change both in terms of resources and technology now and in the future will be the ultimate determining factor in the outcome of future conflicts. As we downsize our force structure and become more reliant on Power Projection as a policy to defend our nation and protect our vital national interests, we must make optimum use of every tool in our "kit bag" to assist the warfighting CINC in successfully executing his operations. The Army Materiel Command, through DESCOM as its executive agent, demonstrated that capability during Operation Desert Shield/Desert Storm by providing Central Command with the requisite theater-level sustainment. Innovative thinking, flexibility and determination in sustaining our front-line soldiers

proved to be a resounding success. As we transition to the Army of the future, we must build on our recent successes, learn from our mistakes and develop viable organizational structures which optimize the use of all resources (civilian and military) to ensure that we maintain our "edge." To that end, CASCOM is working with AMC and DESCOM to institutionalize an organizational entity similar to the U.S. Army Support Group as an integral part of the Theater Army sustainment support structure. The recognition of this approach to integrating wholesale and retail logistics in an operational theater -- building the seamless logistics system of the future -- was most recently demonstrated by the Commanding General of CASCOM, LTG Samuel Wakefield, during his presentation on "Strategic Logistics" at the U.S. Army War College on 25 February 1992.

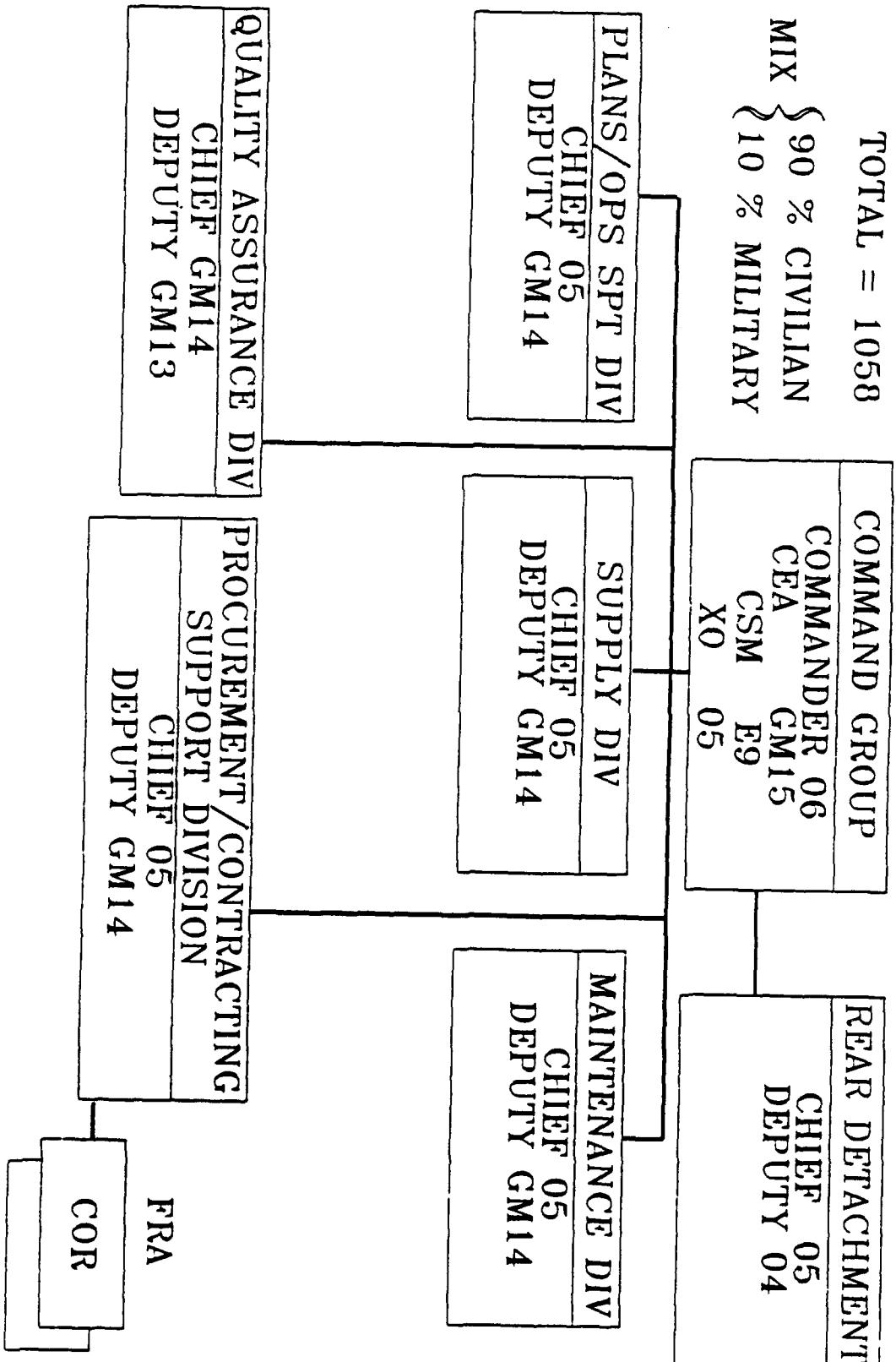
RECOMMENDATIONS

In recognition of the increasing importance of integrating both military and civilian (government and contractor) personnel to sustain the future warfight, the Army needs to aggressively pursue initiatives in doctrine, policy and organizational structures. Bold, innovative thinking must prevail throughout this process. At a minimum, the following recommendations should be considered:

1. CASCOM expedite inclusion of the concept and organization for a contingency/mobilization depot into the force structure.
2. CASCOM, with AMC assistance, develop far-reaching doctrine which will accommodate total integration of the contingency/mobilization depot into future battlefields.

3. CASCOM/AMC integrate the contingency/mobilization depot into major training events (e.g., LOGEX, NTC, JRTC, Bright Star, etc.) in conjunction with the CINCs and other major players.
4. Army review and update personnel policies with respect to civilian mobilization for both government and contractor personnel (e.g., identification cards vs. passports and visas; unit movement orders vs. individual orders; preparation for overseas replacement training requirements; uniform and equipment requirements).
5. Army establish regional processing centers to facilitate the mobilization, training and equipping of civilian personnel, much as the Army does now for our reserve component forces.

FORWARD LOGISTICS SUPPORT GROUP STRUCTURE



ENDNOTES

¹TOE 43-238J500, Section I.

²TOE 43-237J500, Section I

³Interviews with Combined Arms Support Command (CASCOM) staff, Ft. Lee, Virginia, 24-25 October 1991.

⁴In January 1991, I interviewed the commanders and repair technicians (warrant officers) assigned to the 170th HEMCO, Hays, Kansas, and 900th HEMCO, Brundridge, AL, while they were mobilizing and deploying to Saudi Arabia. Neither company had been issued any special tools or test equipment for any of the newer systems, nor had any of their personnel received training on the force modernization systems. In fact, both the commanders and their warrant officers felt uncomfortable with their soldiers' ability to repair anything other than trucks and automotive components.

⁵Interview with LTC (P) Richard W. Hall, former Commander, 544th Maintenance Battalion, Fort Hood, Texas, 3 February 1992.

⁶Ibid.

⁷MG Harry G. Karegeannes and Keith Mostofi, "Support Group Operations in Southwest Asia," Army Logistician, January-February, 1992, pp. 12-14.

⁸Ibid., p. 15, and Keith Mostofi, "Sustainment Maintenance in Southwest Asia," Ordnance, February 1992, p. 13. The largest of these force modernization efforts in Southwest Asia, the so-called M1A1 "Rollover," which involved the upgrade of 743 M1A1 tanks to the Heavy Armor configuration, is described in detail in Bruce Cotton and Joan Gustafson, "Anniston employees take the challenge," Ordnance, August 1991, pp. 3-4.

⁹"The USASG concept was essential to the success of the Army's ODS sustainment efforts." Office of the Deputy Chief of Staff for Logistics, DA, Operation Desert Storm Sustainment, p. 13

¹⁰As an aside, it should be noted that a mainframe computer would not be required for deployment, as the contingency depot could be tied into the CONUS-based wholesale logistics information management system using readily-available communications technology.

¹¹Army Regulation 750-1, Army Materiel Maintenance Policy and Retail Maintenance Operations, 1 November 1991, paragraphs 3-1 and 4-26.

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